

270. The method of Claim 269 wherein the contacting conditions include freezing and thawing.

271. The method of Claim 269 wherein the contacting conditions include heating.

272. The method of Claim 269 wherein the detectable change is observed on a solid surface.

273. The method of Claim 269 wherein the detectable change is a color change observable with the naked eye.

274. The method of Claim 273 wherein the color change is observed on a solid surface.

275. The method of Claim 269 wherein the nanoparticles are metal nanoparticles or semiconductor nanoparticles.

276. The method of Claim 269 wherein the nanoparticles are gold nanoparticles.

277. The method of Claim 269 wherein the oligonucleotides attached to the nanoparticles are labeled on their ends not attached to the nanoparticles with molecules that produce a detectable change upon hybridization of the oligonucleotides on the nanoparticles with the nucleic acid.

278. The method of Claim 277 wherein the nanoparticles are metallic or semiconductor nanoparticles and the oligonucleotides attached to the nanoparticles are labeled with fluorescent molecules.

279. The method of Claim 269 wherein:

the nucleic acid has a third portion located between the first and second portions, and the sequences of the oligonucleotides on the nanoparticles do not include sequences complementary to this third portion of the nucleic acid; and

the nucleic acid is further contacted with a filler oligonucleotide having a sequence complementary to this third portion of the nucleic acid, the contacting taking place under conditions effective to allow hybridization of the filler oligonucleotide with the nucleic acid.

280. The method of Claim 269 wherein the nucleic acid is viral RNA or DNA.

281. The method of Claim 269 wherein the nucleic acid is a gene associated with a disease.

282. The method of Claim 269 wherein the nucleic acid is a bacterial DNA.

283. The method of Claim 269 wherein the nucleic acid is a fungal DNA.

284. The method of Claim 269 wherein the nucleic acid is a synthetic DNA, a synthetic RNA, a structurally-modified natural or synthetic RNA, or a structurally-modified natural or synthetic DNA.

285. The method of Claim 269 wherein the nucleic acid is from a biological source.

286. The method of Claim 269 wherein the nucleic acid is a product of a polymerase chain reaction amplification.

287. The method of Claim 269 wherein the nucleic acid is contacted with the first and second types of conjugates simultaneously.

288. The method of Claim 269 wherein the nucleic acid is contacted and hybridized with the oligonucleotides on the nanoparticles of first type of conjugates before being contacted with the second type of conjugates.

289. The method of Claim 288 wherein the first type of conjugates is attached to a substrate.

290. The method of Claim 269 wherein the nucleic acid is double-stranded and hybridization with the oligonucleotides on the nanoparticles results in the production of a triple-stranded complex.

291. A method of detecting a nucleic acid having at least two portions comprising:
providing a type of nanoparticles according to any one of Claims 243-252 having recognition oligonucleotides attached thereto, the recognition oligonucleotides on each nanoparticle comprising a sequence complementary to the sequence of at least two portions of the nucleic acid;

contacting the nucleic acid and the nanoparticles under conditions effective to allow hybridization of the oligonucleotides on the nanoparticles with the two or more portions of the nucleic acid; and

observing a detectable change brought about by hybridization of the oligonucleotides on the nanoparticles with the nucleic acid.

292. A method of detecting nucleic acid having at least two portions comprising:
contacting the nucleic acid with at least two types of nanoparticles according to any one of Claims 243-250 having recognition oligonucleotides attached thereto, the